CS 411- Software Architecture Design

Midterm Project

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1. INTRODUCTION

We already know and hear about Climate Changed and its bad effects on life all over the world. Since that change causes more natural disasters, it directly threads the existence of life on earth. Earth heat is already starting to increase. As it is drawn in Figure 1.

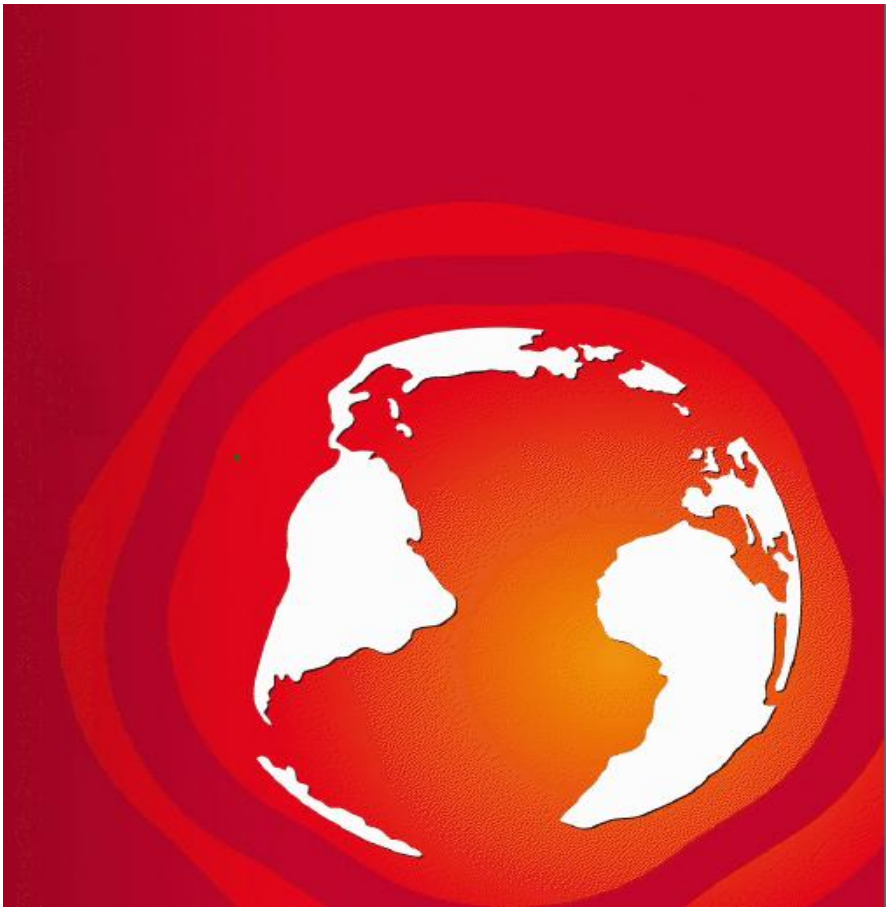

Figure 1 – The picture of heat of the world

Global Warming is the most crucial threat for the future of the world. Organizations that are established to rescue the world are no more just a fiction that is reality itself. UNDP is leading those organizations with its member countries that are almost all united nation members. As it is said in a Chinese proverb "**One generation plants a tree; the next generation gets the shade."** Therefore, previous generations are not giving an importance to the nature while developing new technologies, and technology took place in everyday life without questioning its harm to the balance of ecosystem.

The article that is released by The Transport Sector and Climate Change Community in April 2008 is as below:

"The transport sector is responsible for a significant and growing share of CO_2 emissions. Most indications are that transport activity and emissions will double or more in the next 30 years.

Transport Ministers from upwards of 50 countries around the world will gather with industry leaders and top researchers on 28-30 May in Leipzig at the International Transport Forum on "Transport and Energy: the Challenge of Climate Change". Over 2.5 days, Forum participants will discuss the technological and policy mechanisms for bringing about an energy-efficient, low-carbon future for transport.

In advance of our Forum, we would like to hear from you.

Attached here I have prepared a few thoughts to stimulate some debate. (The Transport Sector and Climate Change) Please read, and then let me know:

In your opinion,

- *What aims and objectives should Ministers have for the transport sector?*
- *What is the role of technology in reducing transport CO_2 emissions? How can best technology be introduced?*
- *What transport policy measures should Ministers support so as to make a real difference?*

The best suggestions and comments will be brought to the attention of delegates and Ministers at the International Transport Forum in Leipzig 28-30 May.

Thanks very much in advance for your participation. I look forward to receiving your input.

With best regards,
Jack Short
Secretary General "

As it is explained $CO_{2\ emissions}$ are the one of most effecting problems. Statistics shows that:

- In the past 100 years the earth has warmed 0.7^0C

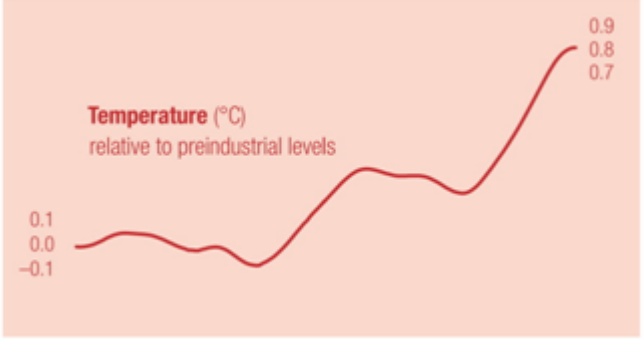

Figure 2.1

- Atmospheric concentrations of CO_2 are increasing at 1.9 ppm each year. It reached 379 ppm in 2005

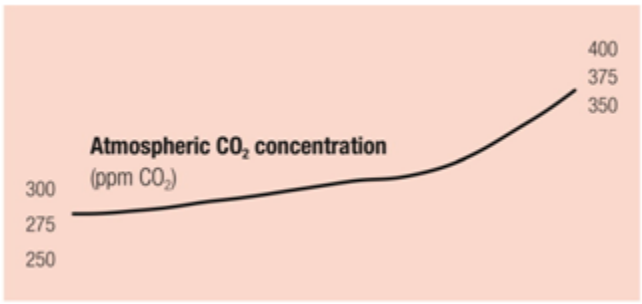

Figure 2.2

- Between 2000 and 2005 an average of 26 Gt of CO_2 was releases into the atmosphere each year

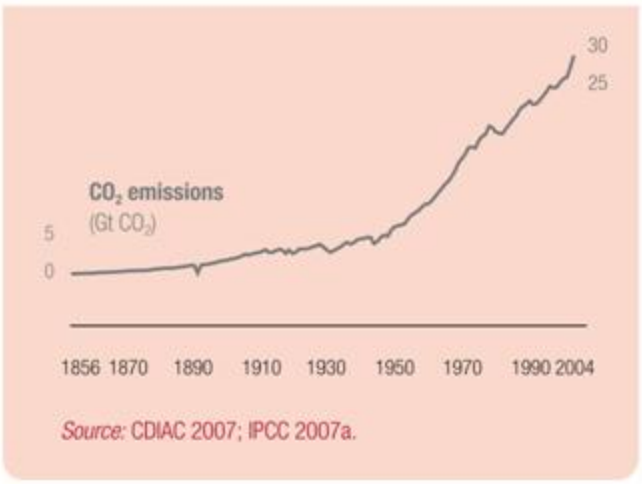

Figure 2.3

To sum up, it is obvious that personal transportation that is cars is the largest consumer of oil cause CO_2 emission. The united organizations and technology producer companies and members of technical faculties met on Copenhagen Climate Change event. Technology producers and especially in automotive industry need to control their products because products have to be produced within the boundaries of some rules and some criteria. As a group we aim to provide a system to car companies such as Mercedes, Toyota. System is able to control and give feedback to responsible engineers and managers about the new product's design and development phases so company can be easily able to produce technology in the boundaries of green productivity. Therefore, market place will have more products, which has less cost and everybody able to use green cars.

In this report we discuss the software architecture design the system. We report on the software architecture design processes and outline the basic requirements that we have derived from the stakeholders. The introduction section describes the context and gives information about the project. The "Problem Statement" section describes the problems and goal of the project. Next, the "Software Architecture Design Process" section describes the steps that should be followed during the design. First step, "Requirements Analysis" section contains the requirements and use case scenarios with prototypes. Secondly, "Technical Problem Analysis" section describes the basic technical problems. And "Domain Analysis" section provides all information about the domain. "Software Architecture Design"section presents logical and conceptual models in UML. Finally, "Conclusion" section and "References" section the report will be ended.

2. PROBLEM STATEMENT

If people look around, they can see harmful effects of their lifestyle. They damage to the world with building, cars, cosmetics etc. Therefore, in our project, we state to reduce environmental impact. Why? Because, it is importantly known that these harmful products cause global warming, they create sudden climate changes and increase the world temperature. Nowadays, big countries try to reach agreement on Kyoto Protocols to make beneficial thing for the environment. Therefore, our project is important for the future of the world.

Many factories do not have software system to check compatibility with green product standards. Although governments do not make regulations about the green product standard, this problem is solved with our software system in the future. Our project has some goals to be successful. Firstly, our system should create self controlling system among factories. They can be aware of the importance of producing green product. Our project should find optimal components for any product to decrease cost because green product should not mean to high cost for the factories. These create easily observable system, so our stakeholders can measure the producing capacity and find a marketing strategy for more producing.

Another goal of our project, we create more familiar engineers to the green products. It is crucial because green product will have more vital importance in the future. Also, we try to reach that greener product for more people. People have cars but they do not care that cars should have beneficial components for the environment. Our system extends usage of these products with awareness and familiarity. They know that any product (for instance, it may be a car) pass from reliable software program which check ratio of the harmful effects and compatibility with the environment.

3. SOFTWARE ARCHITECTURE DESIGN PROCESS

In the project we will use domain-driven approach while developing our software. The architecture design is synthesis based according to the domain driven approach. We will follow the synthesis–based architecture design's steps during the design of our system, and it includes three essential processes which are requirements analysis, technical problem analysis and solution domain analysis.

In the Requirement analysis phase, first we will specify the requirements informally. Then define our use-cases and use case scenarios. Modeling the use cases, we will finalize this phase. As second process, in the Technical problem analysis, we will generalize our requirements as we described in the first step, then identify and specify our sub problems. In the solution domain analysis, we will identify and prioritize the solution domains and knowledge sources. Then by extracting the solution domain concepts, we will have defined the conceptual structure. Figure describes the domain driven approach.

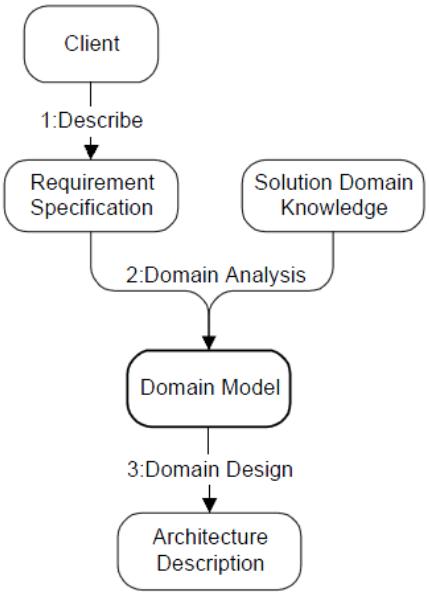

Figure 3- Conceptual model for Domain Driven approach

4. REQUIREMENTS ANALYSIS

4.1 Textual Description of Requirements

A software system for an automotive company, which aims to control its products (that is car in this case) more flexible that if succeeded the criteria of being green that is common name using for less harmful technological products. System has two main parts that are for management and manufacturing. Manufacturing is especially focuses on producing department. That part of system focuses on current products that are on their producing phase and wait to release market area. Therefore, control engineers can easily control the system and get feedback. As it is known producing has different phases which includes design, development and test so system gives feedback report to responsible engineers in order to analyze that product (car) has ensures the requirements of being green. Since design and development are the secret treasures of the companies. System is required to be secure and reliable, and also be reusable and adaptable for many projects that are for upcoming products. In addition to these the other part of the system gives managers a chance to have more control on those phases. Therefore, manager also get feedback of all phases of producing product whenever he wants, can have chance to send and apply new ideas of green product to producing department. This also requires that system should be secure and reliable. Therefore, manager analyzes that company reach the mandatory value for strict protocol government. In addition to these, system has a mini-component most probable which has a microprocessor and a displaying screen to let vehicle driver to view the used factors suitability to environment and sometimes warn driver that he is harming the nature by exceeding the rates.

4.2 Stakeholder Identification

- Government:

Concerns

-Build sustainable communities

-Increase Recycle & Re-use concepts

- Lowering greenhouse gas emissions

- Create healthier environments

- Company: Owner of the System.

Concerns

-Support green technology

-Low Cost

- Company Manager: Manager of the company

Concerns

-Low Cost

-Persistency of the System

- End User: Users of the system, mostly engineers.

Concerns

-Usability of the System

-Privacy of their personal information

-Persistency of the System

- Driver: Car drivers see our system at the usage phase, within the car.

Concerns

-Functionality of the System

-Informed by the car

- Architect: Designer of the System.

Concerns

-Gross Level Structure

-Flawless Design

- Maintainers: Updates the information and recovers from errors in the system.

Concerns

-Adaptability

- Programmers: Developer of the system.

Concerns

-Performance of the System

-Good Design

4.3 Use Case Modeling

After a thorough requirements analysis we have defined the use case model as shown in Figure 1. There are three key actors in the system including *End User who is working for the company as an engineer*, *Manager* and *Customer that is automotive company.*

The use cases for the specified actors are listed below.

End User can;

- Manage the product's economical and environmental cost
- Manage products, their development process
- Check product content
- View project
- Generate report

Manager can;

- Manage end-user
- Manage project
- Update news
- View Report

Customer can;

- View Report
- Manage Manager
- View Cost

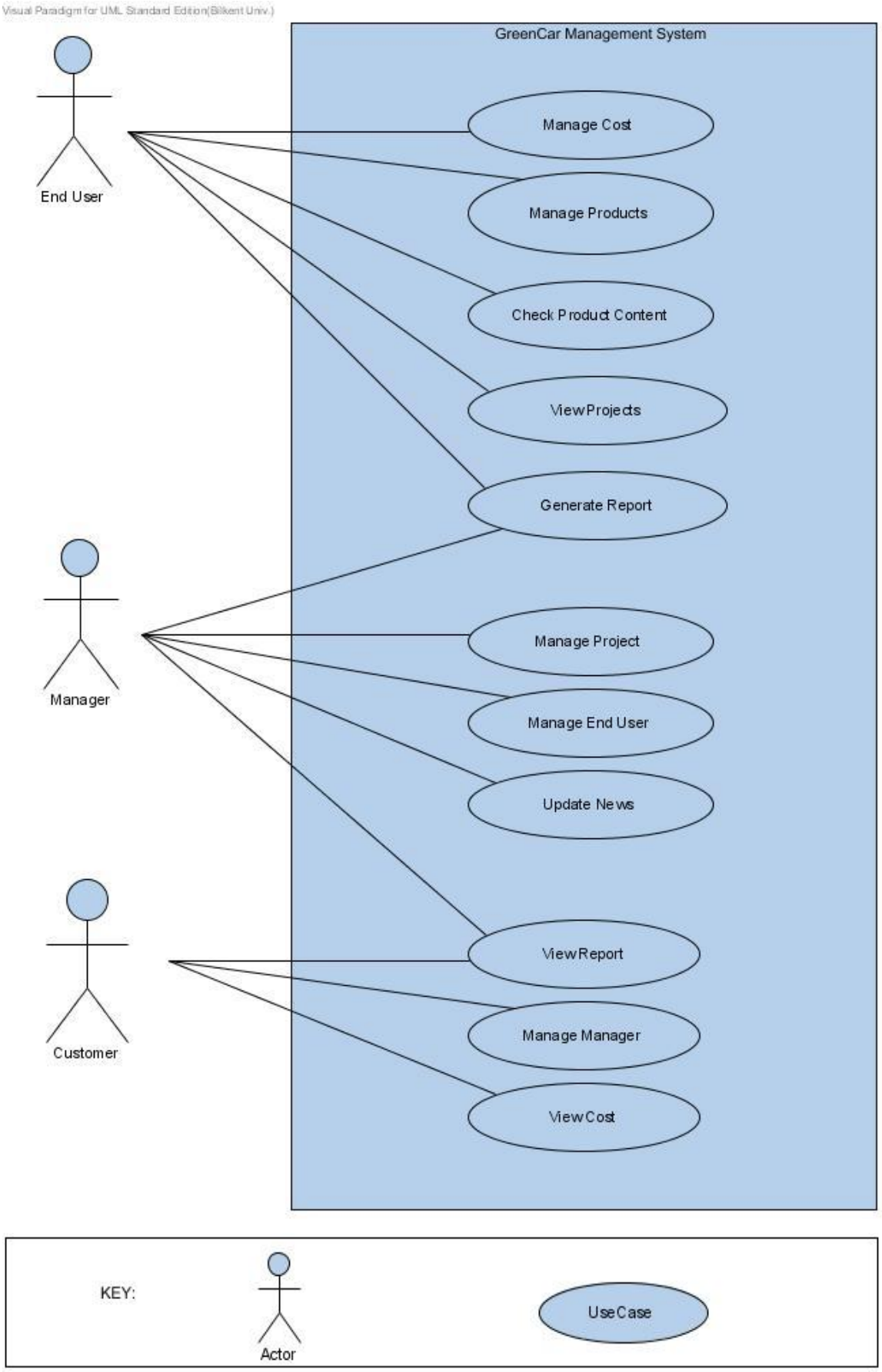

Figure 4 – Use Case Diagram of the system

4.3 Use Case Scenarios

Manage Cost

Primary Actor: End User

Stakeholders and Interests:

- **End User:** Wants to evaluate the economical and environmental cost of the product.
- **Manager:** Wants to be informed about the cost data.

Preconditions: End user logged in to the system by using username/password.

Post conditions: End user observes and views the cost.

Main Success Scenario

1. End User selects the “List Projects” button.
2. System displays the projects.
3. From this screen, End User selects “Project A”.
4. System displays the information of the Project A.
5. End User selects the “Cost” button in the products screen.
6. System displays the “Cost” screen.
7. System displays the normal cost and green cost of the products.
8. End User views the costs and clicks “Calculate Result” button.
9. System displays profit and loss of the each component as well as the total results.
10. End User clicks “Report” button and system informs the Manager of the system.

Extensions

***a. At any time, system fails.**
1. End User restarts the system.
2. System returns to normal functioning.
3. End User logs in to the system and tries to enter Manage Cost Menu.

View Projects

Primary Actor: End User

Stakeholders and Interests:

- **End User:** Wants to view the projects.
- **Manager:** Wants from End user to observe the projects.

Preconditions: End user logged in to the system by using username/password.

Post conditions: End User view the projects.

Main Success Scenario

1. End User selects the “List Projects” button.
2. System displays the projects.
3. From this screen, End User selects “Project A”.
4. System displays the information of the Project A.
5. End User views the project details.

Extensions

*a. At any time, system fails.
1. End User restarts the system. 2. System returns to normal functioning. 3. End user logs in to the system and tries to enter View Projects Menu.

Generate Report

Primary Actor: End User

Stakeholders and Interests:

- **End User:** Wants to generate a report for sending it to the manager.
- **Manager:** Wants to be informed about the projects and products.

Preconditions: End user logged in to the system by using username/password.

Post conditions: End user creates a report and sends it to the manager.

Main Success Scenario

1. End User selects the "List Products" button.
2. System displays the products.
3. From this screen, End User selects "Product B".
4. System displays the screen of the information of the Product B.
5. End User chooses the "Create Report" button in the Product B's page.
6. System displays the Create Report screen.
7. End User fills the report according to the development of the product or any positive or negative comment about the product and send to the manager.

Extensions

***a. At any time, system fails.**
1. End User restarts the system.
2. System returns to normal functioning.
3. End User logs in to the system and tries to enter Main Menu.
7a. End user fills the report.
1. End User sends the report to the Customer.

Check Product Content

Primary Actor: End User

Stakeholders and Interests:

- **End User:** Wants to check and observe the product content whether it is green or not.
- **Manager:** Wants to be informed about the product content.

Preconditions: End user logged in to the system by using username/password.

Post conditions: End user checks the product content and has statistical data.

Main Success Scenario

1. End User selects the “List Products” button.
2. System displays the products.
3. From this screen, End User selects “Product B”.
4. System displays the screen of the information of the Product B.
5. End User chooses the “Product Content” button in the Product B’s page.
6. System displays the Product Content screen.
7. End User checks the criterias that define the whether product is green or not. According to the observation, do the essential operations.

Extensions

*a. At any time, system fails.
1. End User restarts the system.
2. System returns to normal functioning.
3. End User logs in to the system and tries to enter Main Menu.

View Report

Primary Actor: Manager

Stakeholders and Interests:

- **Manager:** Wants to view report from the end user to observe development of the projects and to improve communications between stakeholders.
- **End User:** Send reports about the process of the project.

Preconditions: Manager logged in to the system by using username/password.

Post conditions: Manager views specified report.

Main Success Scenario

1. Manager selects the “View Reports” button.
2. System displays the reports and their sending dates.
3. From this screen, Manager selects “Report A”.
4. System displays the information of the Report A.

Extensions

***a. At any time, system fails.**

1. Manager restarts the system.
2. System returns to normal functioning.
3. Manager logs in to the system and tries to enter View Reports button.

3a. Manager selects "Search Report" from the page

1. Manager state any date from the calendar to find any report.
2. System finds the reports that want to view.
3. System lists the specified report.

Manage Projects

Primary Actor: Manager

Stakeholders and Interests:

- **Manager:** Wants to add project with any topic, as well as wants to cancel and update the project.
- **Manager:** Wants to view the projects.

Preconditions: Manager logged in to the system by using username/password.

Post conditions: Manager approves the adding project. The cancellation /update operation is performed.

Main Success Scenario

1. Manager selects the "Manage My Projects" menu.
2. System displays "Add Project" button.
3. Manager press this button and go to a new page.
4. System displays information about the project.
5. Manager fills the blanks about the project.
6. Manager press "Create" button.
7. System displays a confirmation message whether to add project or not.
8. Manager confirms the message.
9. System add new projects to the system
10. System sends information report to manager screen.

Extensions

***a. At any time, system fails.**

1. Restarts the system.
2. System returns to normal functioning.
3. Manager logs in to the system and tries to enter Manage Project Menu.

2a. Manager selects "Cancel Project" from the menu.

1. Manager searches and finds the project that wants to cancel.
2. System lists the specified projects.
3. Manager selects and deletes the projects.
4. System displays a confirmation message whether to delete project or not.
5. Manager confirms the message.
   5a. Manager declines the message.
      1. Manager searches and finds another project to cancel.
6. System deletes the project and updates the database.
7. System informs the manager and end users that the project is cancelled.

2b. Manager selects "Update Project" from the menu.

1. Manager searches and finds the projects that want to update.
2. System lists the specified projects.
3. Manager selects the project to update.
4. System displays the Project update form.
5. Manager fills the required fields with proper values.
6. Manager submits the form.
7. System updates the project and updates the database.

Manage End User

Primary Actor: Manager

Stakeholders and Interests:

- **Manager:** Wants to add new end user, as well as wants to cancel and update information of end user.
- **Manager:** Wants to view end user.

Preconditions: Manager logged in to the system by using username/password.

Post conditions: Manager approves the adding end user. The cancellation /update operation is performed.

Main Success Scenario

1. Manager selects the “Manage End User” menu.
2. System displays “Add New End User” button.
3. Manager presses button and go to a new page.
4. System displays information about the new end user.
5. Manager fills the blanks about the end user.
6. Manager press “Create” button.
7. System displays a confirmation message whether to add new user or not.
8. Manager confirms the message.
9. System add new user to the system
10. System sends information report to manager screen.

Extensions

***a. At any time, system fails.**

1. Restarts the system.
2. System returns to normal functioning.
3. Manager logs in to the system and tries to enter Manage End User.

2a. Manager selects “Cancel End User” from the menu.

1. Manager searches and finds the end user that wants to cancel.
2. System shows the specified end user.
3. Manager selects and deletes the end user.
4. System displays a confirmation message whether to delete end user or not.
5. Manager confirms the message.
   a. 5a. Manager declines the message.
      1. Manager searches and finds another end user to cancel.
6. System deletes the end user and updates the database.
7. System informs the manager that the end user is cancelled.

2b. Manager selects “Update End User” from the menu.

1. Manager searches and finds the end user that wants to update.
2. System lists the specified end user.
3. Manager selects the information of end user to update.
4. System displays the end user update form.
5. Manager fills the required fields with proper values.
6. Manager submits the form.
7. System updates the information of the end user and updates the database.

Manage News

Primary Actor: Manager

Stakeholders and Interests:

- **Manager:** Wants to add news about the projects to create a good communication between stakeholders with any topic, as well as wants update the news information.
- **Manager:** Wants to view all of the news.

Preconditions: Manager logged in to the system by using username/password.

Post conditions: Manager approves the adding news. The update operation is performed.

Main Success Scenario

1. Manager selects the "Manage News" menu.
2. System displays "Add News" button.
3. Manager press button and go to a new page.
4. System displays area to write news and topic of the news.
5. Manager fills the blanks about the news.
6. Manager press "Create" button.
7. System displays a confirmation message whether to add news or not.
8. Manager confirms the message.
9. System add new to the system
10. System sends information report to all stakeholders screen.

Extensions

***a. At any time, system fails.**
1. Restarts the system.
2. System returns to normal functioning.
3. Manager logs in to the system and tries to enter Manage News Menu.
2a. Manager selects "Update New" menu
1. Manager searches and finds the news that wants to update.
2. System lists the specified new.
3. Manager selects the new to update.
4. System displays the new update form.
5. Manager fills the required fields with proper values.
6. Manager submits the new.
7. System updates the new and updates the database.

Manage Managers

Primary Actor: Company

Stakeholders and Interests:

- **Company:** Wants to add manager, as well as wants to cancel and update the manager information.

Preconditions: Company logged in to the system by using username/password.

Post conditions: Company approves the adding project. The cancellation /update operation is performed.

Main Success Scenario

1. Company selects the "Manage My Managers" menu.
2. System displays "Add Managers" button.
3. Company presses this button and goes to a new page.
4. System displays information about the Managers.
5. Company fills the blanks about the end user.
6. Company press "Create" button.
7. System displays a confirmation message whether to add manager or not.
8. Company confirms the message.
9. System add new manager to the system
10. System sends information report to company screen.

Extensions

***a. At any time, system fails.**

1. Restarts the system.
2. System returns to normal functioning.
3. Company logs in to the system and tries to enter Manage Manager Menu.

2a. Company selects "Cancel Manager" from the menu.

1. Company searches and finds the manager that wants to cancel.
2. System lists the specified managers.
3. Company selects and deletes the managers.
4. System displays a confirmation message whether to delete manager or not.
5. Company confirms the message.
   a. 5a. Company declines the message.

1. Company searches and finds another project to cancel.

6. System deletes the manager and updates the database.
7. System informs the company that the manager is cancelled.

2b. Company selects "Update Manager" from Menu

1. Company searches and finds the manager that wants to update.
2. System lists the specified Manager.
3. Company selects Manager to update.
4. System displays the Manager update form.
5. Company fills the required fields with proper values.
6. Company submits the form.
7. System updates the manager and updates the database.

View Report

Primary Actor: Company

Stakeholders and Interests:

- **Company:** Wants to view report from the end user to observe development of the projects and to improve communications between stakeholders.
- **End User:** Send reports about the process of the project.

Preconditions: Company logged in to the system by using username/password.

Post conditions: Company view specified report.

Main Success Scenario

1. Company selects the "View Reports" button.
2. System displays the reports and their sending dates.
3. From this screen, Company selects "Report A" .
4. System displays the information of the Report A.

Extensions

*a. At any time, system fails.
1. Company restarts the system.
2. System returns to normal functioning.
3. Company logs in to the system and tries to enter View Reports button.
4. Company selects "Search Report" from the page
1. Company state any date from the calendar to find any report.
2. System finds the reports that want to view.
3. System lists the specified report.

4.4 UI Prototypes

Figure 5 – Login screen of the system

Figure 6 – List of the projects screen of the system

Figure 7 – Cost screen of the system

Figure 8 – List of products screen of the system

Figure 9 – Product content screen of the system

5. TECHNICAL PROBLEM ANALYSIS

P1.How to fix the problem of intersecting stakeholder problem?

- **Description**
  Requirement of one stakeholder is decreasing cost but other requires to use green product which needs high costs
- **Initial State**
  Since green components are not common and they are rare in the market they are expensive.
- **Desired State**
  Having more product means to be more in the market after a while components become common so it decreases cost of produce and chosen more by the customer (that are vehicle drivers) increase the sale rate and increase the total profit
- **Urgency/Priority**
  It is urgent to make people eager to buy green product as soon as possible to save the future of the earth.
- **Type of Problem**
  Stakeholder, and Application Domain

❖ **Solution Domain**
Biology, Environmental Science, Ecology, Marketing

P2.Lack of Knowledge for green technology and apply them to automotive sector?

- **Description**
  Since Green Technology is a new term in science and society it is not known how it apply to automotive sector.
- **Initial State**
  Less knowledge about green technology and green products people did not aware that they can be able to get same efficiency in usage with less harm to nature.
- **Desired State**
  Make people especially who are working in automotive sectors' developing product departments more familiar and eager to use green components in products.
- **Urgency/Priority**
  It is urgent to make design and development engineers realize how it is crucial to make products green for less harm
- **Type of Problem**
  Application Domain, Computer Science, Design

❖ **Sub-Problems**
Experienced Engineers might refuse to change their design and development style at that time government policies and the dynamic change in technology make them to fit the new conditions.

❖ **Solution Domain**
Ecology, Green Ca r Technology, Environmental Science, Physics, Chemistry, Math.

P3.How to resolve the security for keeping data?

- **Description**
  System has the company's innovative product developing phases with being green therefore security should be problem
- **Initial State**
  Green Technology in automotive sector is similar in rival companies so it needs some constraints.
- **Desired State**
  Stakeholders will have some constraints by the system in order to keep data safe

- **Urgency/Priority**
  Prior to keep safeness and uniqueness of upcoming product to market.
- **Type of Problem**
  Computer Science, Marketing , Quality

❖ **Solution Domain**
Computer Science

P4. How to do a good performance?

- **Description**
  System has to reusable and reachable and flexible and answer requirement's of stakeholder immediately.
- **Desired State**
  Using powerful algorithms and high level programming languages with experienced programmers.
- **Type of Problem**
  Algorithm Analysis, Computer Science, Economy, Design Engineering.

❖ **Solution Domain**

Algorithm Analysis, Computational Complexity

P5.How to resolve the security for sharing data?

- **Description**
  System has to give appropriate and update criteria for different phases of production
- **Initial State**
  Green Technology has a classical data and criteria. Fuel consuming and electronic design is held in same phase.
- **Desired State**
  Different States of system will be held the criteria as they are classified to the priority of use while producing the new product.

- **Urgency/Priority**
  Prior to follow regular order in producing.
- **Type of Problem**
  Computer Science, Economy, Design Engineering.

❖ **Solution Domain**
Computer Science, Design Engineering.

P6. How to deal with recovery and memory allocation?

- **Description**
  System has to have all the data that is needed for production, test and usage phases . storage shoul be robust.
- **Desired State**
  Good memory allocation and storage is managed with in BCNF/3NF and keep safety with letting the only registered users can reach suitable data.

- **Urgency/Priority**
  Urgent to secure and lossless data.
- **Type of Problem**
  Computer Science, Database Management Engineering.

❖ **Solution Domain**

Database Management Engineering.

P7. How to deal with adaptation?

- **Description**
  Adapting the green part in between other control mechanism problem.
- **Desired State**
  Controlling the succeeding the criteria's of less harm to nature will be a common controlling mechanism as same as testing drives
- **Type of Problem**
  Quality

❖ **Solution Domain**

Architecture Design Methodology.

6. DOMAIN ANALYSIS

6.1 Computer Science

6.1.1 Algorithms Analysis

Algorithms have vital importance to measure the resources space and time efficiency. Therefore, many algorithms are designed to find optimum solution with inputs and their lengths. Why we need algorithms for the software system? Because, we can says that computer do something, but we should also say how to do this thing. It is specified with the algorithms. They apply basic techniques with inputs and try to find the best solution.

Algorithms are a part of the pseudocode, programming languages. Also, algorithm is an important part of computational complexity theory, it is used for the estimation to search for efficient algorithms.

Knowledge Sources	**Form**
Communications of the ACM by Kowalski, Robert	Textbook
Fundamental Algorithms, Third Edition. Reading, Massachusetts: Addison-Wesley by Knuth, Donald (1997).	Textbook
Introduction to the Theory of Computation, Michael Sipser,	Textbook
Algorithms	Course Slides

Evaluation of Sources

Knowledge Sources	Objectivity	Relevance
Communications of the ACM by Kowalski, Robert	Medium	Medium
Fundamental Algorithms, Third Edition. Reading, Massachusetts: Addison-Wesley by Knuth, Donald (1997).	Medium	High
Introduction to the Theory of Computation, Michael Sipser	Medium	Medium
Algorithms	Medium	High

Glossary

Pseudo code: "is a compact and informal high-level description of a computer programming algorithm that uses the structural conventions of a programming language, but is intended for human reading rather than machine reading. "(1)

Programming Language: It is designed as an artificial language. It makes computations with a smart machine. PL express algorithms clearly, create end user screen system with human interaction.

Complexity Problem: It concerns the space and time of the system in the memory.

6.1.2 Database Management System

"Databases consist of software-based "containers" that are structured to collect and store information so users can retrieve, add, update or remove such information in an automatic fashion. Database programs are designed for users so that they can add or delete any information needed. The structure of a database is tabular, consisting of rows and columns of information." (1). Therefore, it is the most useful concepts for the software system. Software systems make life easier with presenting the historical data. Why database is used frequently? Because, it is a set of prewritten programs and flexible database query language to use it. Also, it provides DBMS security for reliable data storing.

Knowledge Sources

Knowledge Sources	Form
Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3. Ed.	Textbook
http://en.wikibooks.org/wiki/Design_of_Main_Memory_Database_System/Overview_of_DBMS	Online Book
Encyclopedia of Database Systems, by Ling Liu and Tamer M. Özsu (Eds.)	Online Book

Evaluation of Sources

Knowledge Sources	Objectivity	Relevance
Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3. Ed.	High	High
http://en.wikibooks.org/wiki/Design_of_Main_Memory_Database_System/Overview_of_DBMS	Medium	Medium
Encyclopedia of Database Systems, by Ling Liu and Tamer M. Özsu (Eds.)	Medium	High

Glossary

Structured: Database system has some specialty and construct on some features. These features come together and create some structures which cause structured system.

Add/ updating / deleting: Adding values to the tables or updating or deleting value from the tables of the DBMS

DBMS security: "Access control ensures and restricts who can connect and what they can do to the database."(1)

Database Query Language: A database query language allows users to analyze its data and update it according to the users' privileges on data.

6.2. Environmental Science –Ecosystem

Environmental Science is an interdisciplinary academic field that integrates physical and biological sciences (including physics, chemistry, biology, soil science, geology, and geography) to the study of the environment, and the solution of environmental problems. Environmental science provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems [1]

Environmental Scientists work on subjects like the understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management, and the effects of global climate change. [2]

Climate Change is the crucial thread for balance between habitats in the Ecosystem that is the term which combines balanced physical and biological components of an environment.

References:

1. Environmental Impact Assessment: Practical Solutions to Recurrent Problems
2. **What is Environmental Science?- Article**

Knowledge Sources

Knowledge Sources	**From**
Fundamentals of Stack Gas Dispersion	Textbook
Worker of Delta-Eko	Person
What is Environmental Science?- Article	Iowa State University Environmental Science Program.
Environmental Impact Assessment: Practical	Textbook

Solutions to Recurrent Problems	
Land Cover Classification System (LCCS): Classification Concepts and User Manual. Antonio Di Gregorio & Louisa J.M. Jansen	Textbook

Evaluation of Sources

Knowledge Sources	**Objectivity**	**Relevance**
Fundamentals of Stack Gas Dispersion	Medium	High
Worker of Delta-Eko	Medium	High
What is Environmental Science?- Article	High	High
Environmental Impact Assessment: Practical Solutions to Recurrent Problems	Medium	High
Land Cover Classification System (LCCS): Classification Concepts and User Manual. Antonio Di Gregorio & Louisa J.M. Jansen	Medium	High

Glossary:

Habitat: The place where a population (e.g., human, animal, plant, micro-organism) lives and its surroundings.

Pollution Prevention: Measures taken to reduce the generation of a substance that could be harmful to living organisms if released to the environment. Pollution prevention can be achieved in many ways.

Emission: Discharges into the atmosphere from such sources as smokestacks, residential chimneys, motor vehicles, locomotives, and aircraft.

Ecosystem: Combined physical and biological components of an environment.

6.3 Green Technology (For Vehicle Industry)

A green vehicle is one that is significantly less harmful to the environment than comparable conventional vehicles. Presently, the term is used for any vehicle surpassing the Euro6-norm such as LEVs and ULEVs, and also more informally to California's zero emissions vehicles and other low-carbon emission vehicles. Certain green vehicles may provide a way of sustainable transport.[1]

Vehicle emissions contribute to the increasing concentration of gases that are leading to **climate change.** In order of significance, the principal **greenhouse gases** associated with road transport are carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Road transport is the third largest source of UK greenhouse gases and accounts for over 20% of total emissions. Of the total greenhouse gas emissions from transport, over 85% are due to CO2 emissions from road vehicles. The transport sector is the fastest growing source of greenhouse gases.

Road transport also remains the main source of many **local emissions** including benzene, 1,3-butadiene, carbon monoxide (CO), nitrogen oxides (NOx) and particulates (PMs). Within urban areas, the percentage of contributions due to road transport is particularly high - in London road transport contributes almost 80% of particulate emissions. There is a growing body of evidence to link vehicle pollutants to human ill health including the incidence of respiratory and cardio-pulmonary disease and lung cancer. In 1998 the Committee on the Medical Effects of Air Pollutants estimated that up to 24,000 people die prematurely each year in the UK as a direct result of air pollution. Similar findings are emerging from international research. According to the World Health Organization, up to 13,000 deaths per year among children (aged 0-4 years) across Europe are directly attributable to outdoor pollution. The organization estimates that if pollution levels were returned to within EU limits, more than 5,000 or these lives could be saved each year. [2]

In addition to that information: Green cars are measured as their guidance the using energy type:

References:

Holgate, S. Quantification of the Effects of Air Pollution on Health in the United Kingdom. The Stationery Office, London, 1998; WHO (2004) One in three child deaths in Europe due to environment. World Health Organization, June 2004.

Knowledge Sources

Knowledge Sources	**From**
Fundamentals of Stack Gas Dispersion Holgate, S. Quantification of the Effects of Air Pollution on Health in the United Kingdom. The Stationery Office, London, 1998	Article-Organization
WHO (2004) One in three child deaths in Europe due to environment. World Health Organization, June 2004.	Article -Organization
UNDP Human Development Report for Fighting Climate Change	Presentation
Mercedes- BlueEfficiency Producing Article	Website
What a Green Car Measurements Article- www.whatagreencar.com	Website

Evaluation of Sources

Knowledge Sources	Objectivity	Relevance
Fundamentals of Stack Gas Dispersion Holgate, S. Quantification of the Effects of Air Pollution on Health in the United Kingdom. The Stationery Office, London, 1998	Medium	High
WHO (2004) One in three child deaths in Europe due to environment. World Health Organization, June 2004.	Medium	High
UNDP Human Development Report for Fighting Climate Change	Medium	High
Mercedes- BlueEfficiency Producing Article	Medium	Medium
What a Green Car Measurements Article- www.whatagreencar.com	Medium	Medium

Glossary:

Green collar

Green collar is any kind of employment that involves products or services that are environmentally friendly. Presidential candidates in the 2008 election cycle have endorsed the creation of green collar jobs to boost the economy, like "solar panel installation, weatherizing homes, brewing biofuels, building hybrid cars and erecting giant wind turbines." (Green collar jobs at NYTimes.com)

Green computing

Green computing is the environmentally responsible use of computers and related resources. Such practices include the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste).

Green data center

A green data center is a repository for the storage, management, and dissemination of data in which the mechanical, lighting, electrical and computer systems are designed for maximum energy efficiency and minimum environmental impact. The construction and operation of a green data center includes advanced technologies and strategies. Building and certifying a green data center or other facility can be expensive up front, but long-term cost savings can be realized on operations and maintenance. (E-book on green computing and data center energy efficiency

Green networking

Green networking is the practice of consolidating devices, relying more on telecommuting and videoconferencing, and using virtualization to reduce power consumption across the network. (Special Report on Green Networking)

Biodiesel

Biodiesel is non-petroleum-based diesel fuel derived from vegetable or animal fats. Ethanol is the most common form of biodiesel, based on corn in the US or sugar cane in Brazil, though other forms that utilize pig waste, algae or switchgrass are being developed. (Wikipedia)

Hybrid electric vehicles:

Hybrids combine an internal combustion engine with a battery and electric motor, offering the extended range and rapid refueling of a conventional vehicle but with the potential for much higher fuel economy. However, not all hybrids are created equal; some use the technology to increase acceleration rather than boost gas mileage. The UCS Hybrid Center website provides information about and comparisons of current hybrid models.

Flex-fuel vehicles:

FFVs have a single fuel tank, fuel system, and engine, but are designed to run on any blend of gasoline and ethanol, up to 85 percent ethanol (a mixture known as E85 that can modestly reduce a vehicle's global warming emissions such as carbon dioxide). Unfortunately, E85 fueling stations are not available in all states; check the Department of Energy's Alternative Fuel Station Locator for a list of stations nearest you.

Natural gas vehicles: Auto making offering passenger cars that run on compressed natural gas (CNG). CNG emits less air pollution and carbon dioxide than gasoline, but as with E85, CNG fueling stations are not widespread.

6.4 Computational Mathematics

Computational mathematics involves mathematical research in areas of science where computing plays a central and essential role, emphasizing algorithms, numerical methods, and symbolic methods. Computation in the research is prominent.[1] Computational mathematics emerged as a distinct part of applied mathematics by early 1950s. Currently, computational mathematics can refer to or include: Numerical Methods, and Algebra.[1]

References: Computational Mathematics, Algorithms, and Scientific Software, by R. Rheinbold, 1985

Knowledge Sources

Knowledge Sources	Form
Computational Mathematics, Algorithms, and Scientific Software, by R. Rheinbold, 1985	Textbook

Evaluation of Sources

Knowledge Sources	Objectivity	Relevance
Computational Mathematics, Algorithms, and Scientific Software, by R. Rheinbold, 1985	Medium	High

Glossary:

Algebra: A branch of mathematics that substitutes letters for numbers. An algebraic equation represents a scale, what is done on one side of the scale with a number is also done to the other side of the scale. The numbers are the constants.

Algorithm: A step-by-step problem-solving procedure for solving computational mathematical problems.

Constant: A value that doesn't change.

Ratio: The relation between to quantities. Ratios can be expressed in words, fractions, decimals or percents. E.g., the ratio given when a team wins 4 out of 6 games can be said a 4:6 or four out of six or 4/6.

6.5 Marketing

It is basically means that concerning the customers' needs and satisfaction. "The marketing concept is a philosophy. It makes the customer, and the satisfaction of his or her needs, the focal point of all business activities. It is driven by senior managers, passionate about delighting their customers." (2). Also, "You might think of marketing this way. If business is all about people and money and the art of persuading one to part from the other, then marketing is all about finding the right people to persuade."(3). Therefore, only producing a product is not enough because customer satisfaction is valid for the product.

Knowledge Sources

Knowledge Sources	**Form**
Definition of Marketing", American Marketing Association.	Essay
International Marketing: Modern and Classic Papers by Paliwoda, Stanley J.; John K. Ryans. "Back to first principles".	Book
Industrial Engineer	Person

Evaluation of Sources

Knowledge Sources	**Objectivity**	**Relevance**
Definition of Marketing", American Marketing Association.	High	High
International Marketing: Modern and Classic Papers by Paliwoda, Stanley J.; John K. Ryans. "Back to first principles".	Medium	Medium
Industrial Engineer	Medium	High

Glossary

Product: producing thing for marketing.

Senior managers: observe the marketing in the company and manage the marketing department staff.

Customers: they have concerns about the system.

References

[1]http://en.wikipedia.org/wiki/Database

[2]http://marketingteacher.com/Lessons/lesson_what_is_marketing.htm

[3]http://www.tenonline.org/art/mm1/9301.html

7. SOFTWARE ARCHITECTURE DESIGN

7.1 Feature Diagram

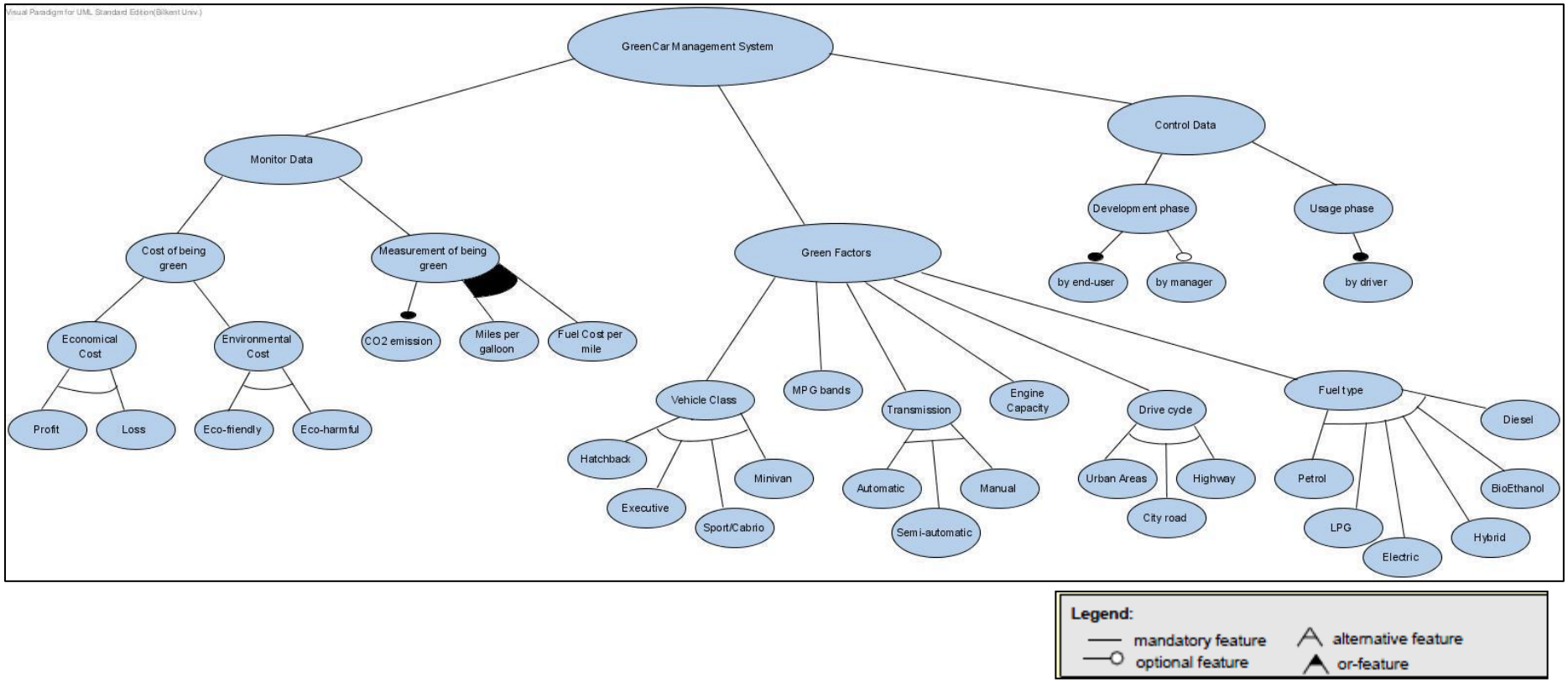

Figure 10 – Feature Diagram of the system

7.2 Class Diagram

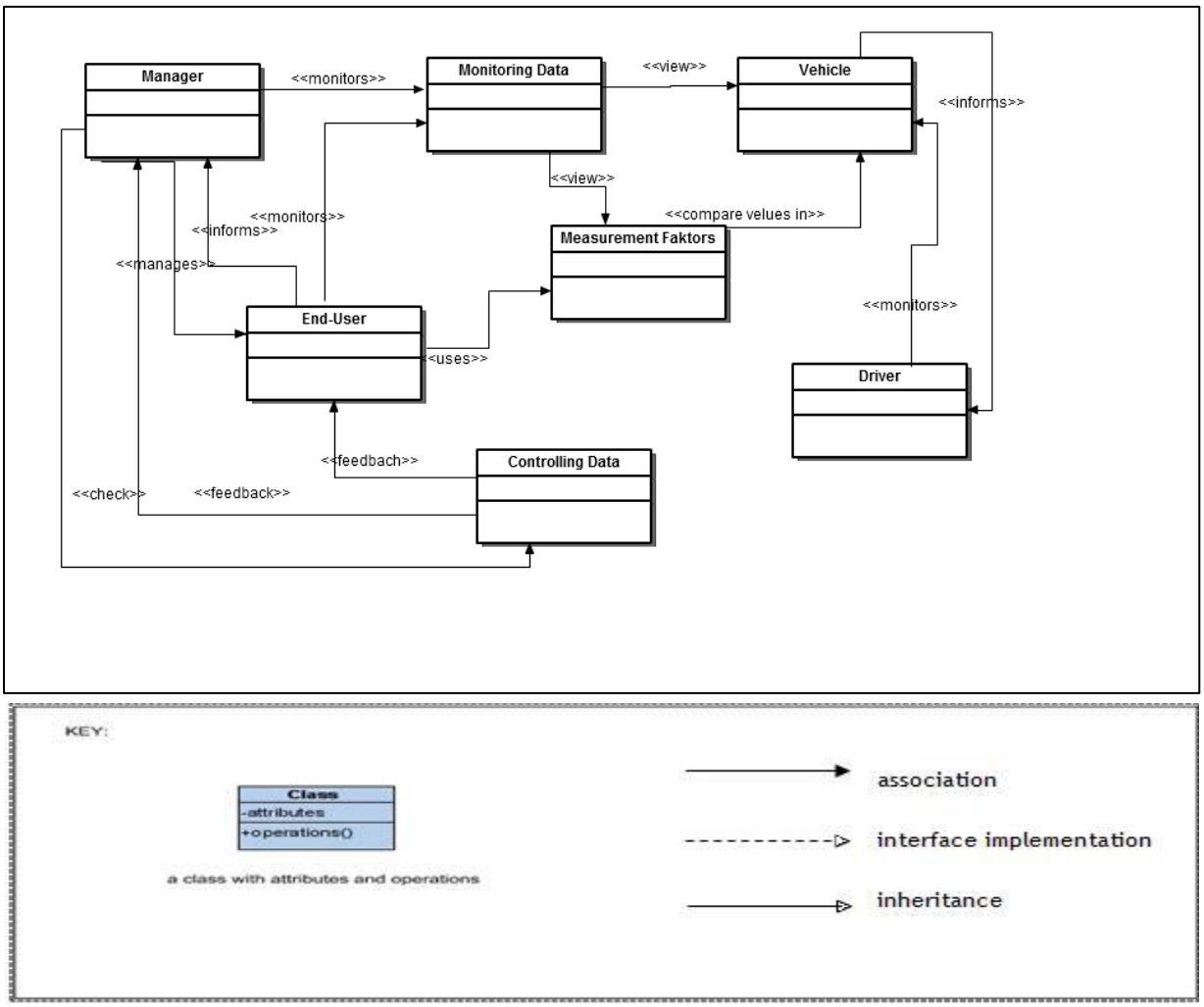

Figure 11 - Class diagram of the system

7.3 Context Diagrams

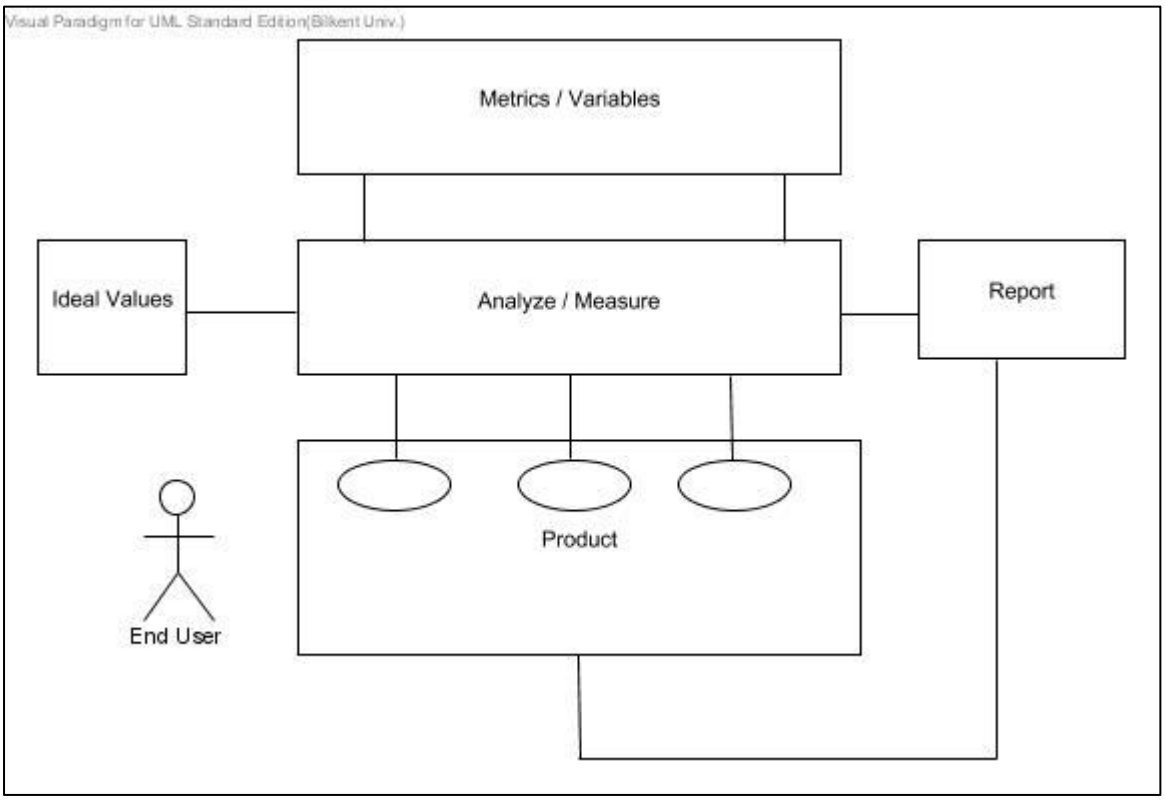

Figure 12 - Context diagram of the system

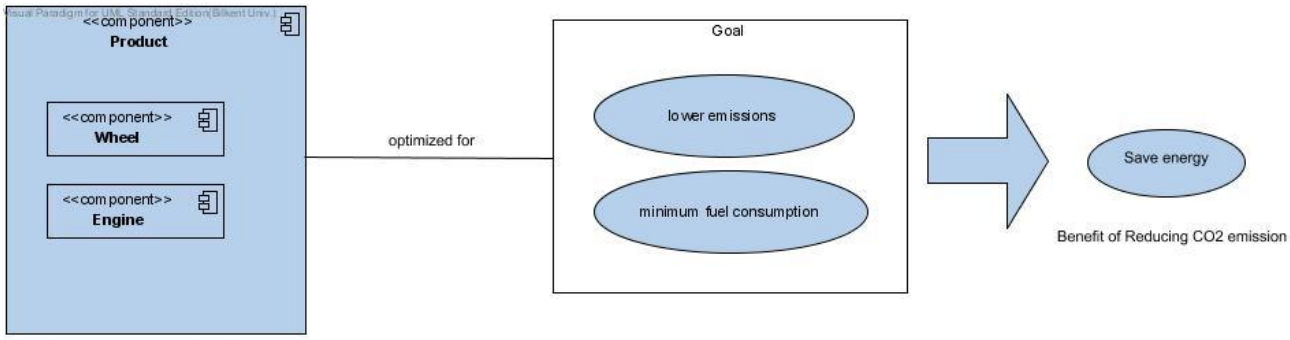

Figure 13 - Context diagram of the system

8. CONCLUSION

In this project, we learned the most important steps to create architectural software system. Firstly, we tried to create good communication among us to discuss and present our ideas. After deciding the ideas about the system, we stated our problem and goals. It is the hard part of the project because we were forced to create our project branches. We sometimes extended our branches and thought unnecessary things.

After the goal of the projects, we decided to our textual part to state our project clearly. This part helped us to identify out stakeholders. Then, according to stakeholders, we started to discuss our requirements. We started to write our scenarios and decided our prototypes. There are many methods to design the project. The most important thing was some of the phases facilitate to do following phase.

We struggled with the technical problems. We thought that we use the system and tried to think creatively to present solutions to the technical problem. After that, we decided to domain resources to have the best solutions.

Then, we discussed on the modeling. It is the creative part because we realize that engineers manage time efficiently. They correspond the needing of the system, so model is chose after the stakeholders agreements. We made our feature diagram and it is instructive for us to learn their specialty.

REFERENCES

[1] http://www.whatgreencar.com/

[2] http://www2.mercedes-benz.co.uk/content/unitedkingdom/mpc/mpc_unitedkingdom_website/en/home_mpc/passengercars/home/new_cars/blueefficiency.html

[3] http://www.greencar.com/

[4] http://www.synovate.com/news/article/2009/07/global-automotive-survey-finds-six-in-ten-people-prefer-green-cars-even-if-money-no-object.html

[5] http://www.toyota.com.tr/innovation/index.aspx